TWO RISKY AND COSTLY END-USER RELATED TABOOS WHEN DEVELOPING INFORMATION SYSTEMS: QUALIFICATIONS AND ACCOUNTABILITY

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SUMMARY

This work highlights two critical taboos in organizations: 1) taking for granted the quality of certain capabilities and attitudes of the end-user representatives (EUR) in information systems development projects (ISDP), and 2) the EUR's inherent accountability for losses in IS investments. These issues are neither addressed by theory nor research when assessing success/failure. A triangulation approach was applied to combine quantitative and qualitative methods, having convergent results and showing that in problematic cases, paradoxically, the origin of IS rejection by end users (EU) points towards the EUR themselves. It has been evaluated to what extent some EUR factors impacted a macro ISDP involving an enterprise resource planning (ERP) package, ranking the 'knowledge of the EUR' as the main latent variable. The results validate some issues found throughout decades of praxis, confirming that when not properly managed the EUR role by itself has a direct relationship with IS rejection and significant losses in IS investments.

In reference to the public sector, directly addressed in this research, Goldfinch (2007, p. 917) argues that "The majority of information systems developments are unsuccessful. The larger the development, the more likely it will be unsuccessful. Despite the persistence of this problem for decades and the expenditure of vast sums of money, computer failure has received surprisingly little attention in the public administration literature." However, this assertion can be applied to organizations in general. Various authors have cited alarming statistics about total or partial failures, overruns in ISDP's budgets and schedules, which have continued throughout decades at a global level, and with a tendency to increase as ISDP grow in number (Wu and Fang, 2007; Ouadahi, 2008; Conboy, 2010;Laudon and Laudon, 2012). This leads to significant increases in costs or losses for organizations in their IS investments, posing serious challenges to all levels of management and IS professionals, as well as a reduction of such investments. Although the study of this topic began in the 1960s (Bartis and Mitev, 2008), this situation continues to grow, reflecting how necessary it is to deepen its study (Al-Ahmad *et al.*, 2009; Conboy, 2010; Meissonier and Houzé, 2010; Laudon and Laudon, 2012; Mithas *et al.*, 2012).

Laudon and Laudon (2012) define the term 'end user' (EU) as the workers (operational staff and management levels) who use IS to perform business activities, thus differentiating them from IS/IT personnel, customers, suppliers, associated companies or any other stakeholder who might have access to the IS. However, only a sample of the EU is usually summoned to fulfill these tasks, the EUR, who are those assigned to the ISDP as representatives of the rest of the organization user community. For example, it corresponds to the EUR to properly specify the non-technological features, the information and the business-functional

KEYWORDS / Critical Risk Factors / Development and Implementation / End-User Capacities and Attitude / Information Systems / Management Challenges /

Received: 05/07/2013. Modified: 02/07/2014. Accepted: 02/18/2014.

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characteristics of the IS to be developed for all users and to carry out the respective validations. Additionally, it is known that when IS, used by external stakeholders as well, are rejected or not properly used by the EU the problem magnifies itself and can damage such critical relationships, adding a socio-economic cost difficult to recover.

Although the dimensions analyzed on the EUR have been studied previously, we believe that these have been treated superficially, omitting relevant indicator variables or treating them separately. Several researchers emphasize the relevance of the problem and recognize the need to delve into it (DeLone and McLean, 2003; Bruque *et al.*, 2004; Yoruk and Ercan, 2006; Myers, 2009; Yu-Chih *et al.*, 2010; Mithas *et al.*, 2012). For example, only few of the studies found took into account the variable knowledge of the EUR, which is evaluated almost exclusively based on the EUR's mastery of IT. In the best of cases, the fact that the problem still remains demands more and deepening research using new approaches, like the one presented herein. Previous investigations measure IS success only in one of two periods: 1) during the development process, as such, where the metrics used mainly address budgets and schedules, and 2) the post implementation period, where the authors usually focus on the IS technical performance (Myers, 2009). However, none of these investigations connects both periods to measure how the contributed skills and attitude of the EUR, in the first one, impacted the outcomes observed during the second one. Although ERP software packages, which include several IS modules (or applications), basically require only a parameter configuration process rather than a development process, it is well known that in many cases some modules do not provide the functionality needed, thus making necessary to resort to a partial or full development process.

The following features highlight the originality of this study: 1) Addressing the void found in dozens of papers that deal with rejections, losses or cost overruns from ISDP, without reference to its possible link with an inadequate selection of the EUR, and even less to their inherent responsibility. The latter is equally ignored and disregarded by organizations, theory and research. 2) The inclusion of the EUR at both ends of the proposed model, placing them in a bidirectional relationship with themselves, and showing its critical weight, on the one hand, as the architects responsible for the functional quality of the IS and, on the other hand, as the main group of stakeholders whose voluntary acceptance will define the highest percentage of IS true success, once implemented. 3) The connection of the two periods referred to with an emphasis on functional business success, rather than on technical success, and the possible acceptance of the IS by most EU. This is done through the assessment of the impact of key EUR's variables not only during the development of the IS but after the implementation stage, when the performance, acceptance and usefulness of the IS can be truly determined by quantitative and qualitative analyses.

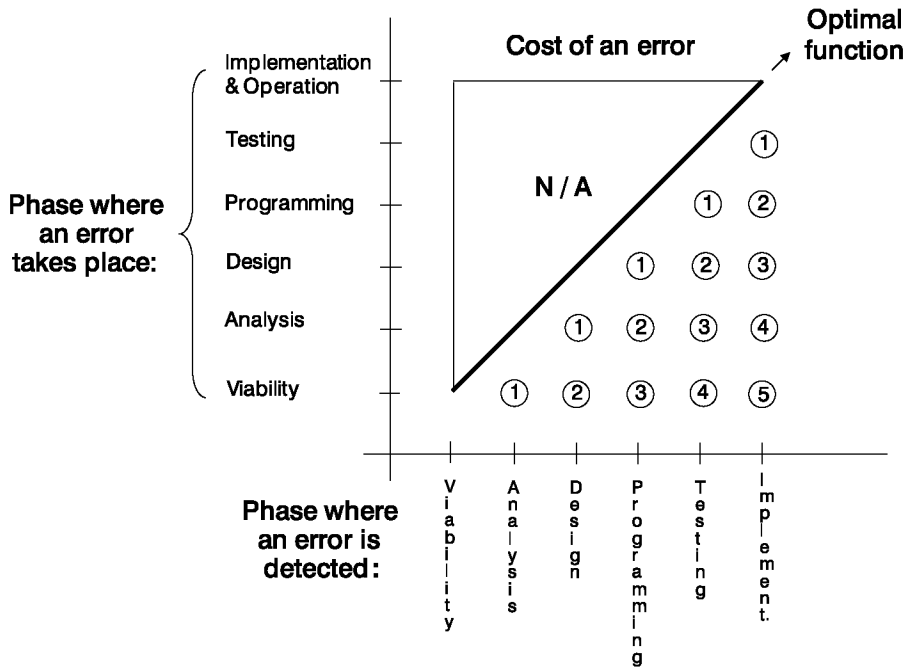

Figure 1. Cost of errors during IS development or after implementation. Adapted from Cohen and Asin (2004).

Cost of errors

All ISDP are subject to unexpected changes due to uncontrollable variables, internal or external to an organization, leading to the rework of earlier development phases. Most changes and reworks arise from missing or wrong IS specifications made by the EUR. However, as mentioned before, no IS research addressing directly the EUR's inherent responsibility and accountability for such drawbacks (and their costs) has been found. Figure 1 reminds us how the cost of correcting mistakes, during or after implementation, varies according to the stage where an error is made and that where it is detected, based on the number of earlier phases between them that will have to be revisited, shown by the digits in the circles, in order to correct the error. The diagonal straight line represents the optimal function or the zero-cost benefit of detecting an error in the same phase where it originated. Note that these costs are referred only to the repeat of earlier phases of development; so, extra costs associated with correcting major errors should be added. It must be noted that the activities of identification and correction of errors are usually accompanied by high levels of stress and longer implementation times. Because changes cannot be predicted in advance, flexibility must be maintained. However, flexibility frequently comes at a cost which calls for a trade-off between the desired flexibility level and its costs.

Research Questions and Objectives

Two key questions define this empirical study: 1) To what degree certain EUR-taboo issues related to their skills and attitude, including sub-dimensions that have been addressed individually, superficially, or ignored impacted the development of the IS in the studied macro ISDP? 2) How those issues influenced the ISDP's outcomes, costs, and the IS ultimate success? To answer these questions two specific objectives were set out: i. To assess statistically to what degree and how the involved latent variables could have impacted the success of the IS. ii. To carry out a qualitative evaluation of the phenomenon throughout both periods with the purpose of finding quantitative and qualitative results that com-

bined can lead to explain a possible causal relationship between the role of the EUR and the issues presented in the introduction.

Additional contributions to IS theory and practice

The first intended practical contribution of this study is to issue an alert call to managers and practitioners involved in ISDP, aiming to raise awareness of these problems, followed by an ampler and deeper analysis of some critical aspects of the EUR which lie hidden due to political and social taboos in organizations. However, it should be clarified that it is not an objective of this research to stigmatize the role of the EUR, but to give visibility to a problem that concerns multiple levels of management, with which the first author has dealt throughout years of praxis in the IS field at different types of large organizations. Secondly, to present some evaluation parameters that allow for preventive actions to unveil and neutralize potential risks. An additional contribution to IS theory is a possible retrospective expansion of the revised model of DeLone and McLean (2003) by placing our model´s latent variables as predictive variables of their constructs 'information quality' and 'IS quality (as an IT tool)'.

Theoretical Antecedents, Hypothesis and Proposed Model

For decades, researchers have proposed models on IS success empirically validated, including variables related to the EU in an attempt to understand their role (Bartis and Mitev, 2008; Al-Ahmad *et al.*, 2009; Myers, 2009; Laudon and Laudon, 2012). However, this role continues to be a complex set of dimensions that merits further investigation as to its relationship with the aforementioned statistics. A review of the state of the art did not find any study on the success/failure of IS that addressed the topic from the present perspective, neither in developed nor in developing countries. Bruque *et al.* (2004) analyzed the relationships between some resources based on intangible human factors and business results, as well as the relationship between the latter and the degree of use of IT. However, these authors did not analyze empirically the relationship between those human intangibles and IT acceptance.

Powell and Dent-Micallef (1997) presented a classic model that shows how IT alone is not sufficient to produce sustained business performance and advantages. Human and organizational resources must be well integrated in the mix. A specific critical mix in the processes of IT development and implementation as addressed in our research. The results found by these authors "... suggest that, of all resources in the IT equation, human resources are probably the most neglected and difficult to master." Resource-and-capability-based theories propose the study of human and performance factors, usually heterogeneous, in organizations and how they can bring them to a higher level of competitiveness, especially as these characteristics are supported by IT. Recent studies, such as those of Matías (2000), Alfaro (2008), Lech (2011), Breznik, (2012), Moncada (2012) and Prasad *et al.* (2012), further Powell and Dent-Micallef´s research model and bring new and helpful insights to management.

Nonetheless, according to Araya *et al.* (2006), most studies do not present an integrated vision of these elements, thus downgrading the importance of such relationships. An organizational aspect associated to resource-and-capability-based theories related to the EUR, and frequently observed in the IS practice, usually becomes a serious weakness. That is the case when a strategic business plan is not properly broken down into, and in gear with, tactic and operational plans. Such a weakness renders middle and lower management levels (main EUR areas) incapable of understanding and communicating the changes in the current business processes and procedures required during ISDP and along the IS life cycle.

New and interesting strategies designed to deal with behavioral factors have been emerging recently. One of them is 'gamification', a powerful tool to engage employees, change behaviors, develop skills and drive innovation. Though it was coined by Chuck Coonradt back in 1984 in his book *The Game of Work* (Lantigua, 2013), Gartner (2014) indicates that gamification (game mechanics and game design techniques in non-gaming contexts) "has emerged as a significant trend in recent years... as engagement strategies for business and IT". In the IT arena, these techniques "provide an opportunity to engage individuals, and to modify and reinforce individual behavior, increasing the likelihood of project success." (Green, 2012)

This research focuses precisely on human intangibles that lead to voluntary and satisfactory development and use of IS or the reasons and consequences otherwise. As argued by Andrade and Mandrillo (2004, p2), IS and their supporting technologies "are institutionalized through the power which is explained by examining the political dimension of the organizations and the elements that constitute them". IS based on computers reaffirm social practices in organizations and given that these can be regarded as a set of automated and recursive social practices, they engulf hidden power structures in the decision-making processes undertaken to develop IS and that should be analyzed by management (*Ibid*). We also uphold the opinion of Walsham (1995) about the growing criticality of the social aspects of IS, especially in recent years, regarding meanings and human interpretations. Some renowned researchers have highlighted the impact of human factors in the construction of IS and argue that extant literature on IS success has given only marginal attention to the active social behavioral aspects (Llorens, 2005; Kappelman *et al.*, 2006; Myers, 2009; O'hEocha *et al.*, 2010; Chen *et al.*, 2011; Laudon and Laudon, 2012; Mithas *et al.*, 2012). These authors believe that such connections are yet to be well-established and that competencies still remain little explored (Yu-Chih, *et al.*, 2010). We also concur with Andrade (2003) on the need to understand that IS are tools that legitimize power in organizations. Therefore, the statistical analysis in this study is supplemented with an interpretative analysis thus applying the method known as triangulation, explained in the section on methodology.

Assessing IS success

To evaluate IS success, this study is initially based on the revised model of DeLone and McLean (2003), which has been empirically tested in a number of cases. Such model places the dimension 'EU satisfaction' as a criterion variable of three latent variables, analyzed post-mortem, namely the 'IS information quality', 'IS quality' (as a tool) and 'service quality' (received from the IT department). The latter is external to EUR and hence beyond the scope of this study. Similarly, justification is found in other studies that sustain the dominance of EU satisfaction over that of other stakeholders and as a synonym for IS success (Conboy, 2010; Yu-Chih *et al.*, 2010). For example, Ravichandran and Rai (2000, p132) believe that EU satisfaction is a critical dimension and therefore "... it is

considered a valid information systems quality measure, since it reflects the subjective evaluation of its features and functionality." Yoruk and Ercan (2006) pose that an IS development involves an expensive process whose output in a number of cases does not meet the expectations of the EU after its implementation. These authors also highlight a common situation in which IS designers and developers often have difficulties to understand the requirements of the EU and that more than 50% of the errors along the development process take place at the requirements definition stage of the analysis phase. Since the design and programming phases are critical, such errors cause delays and economic consequences.

Having studied a sample of more than 400 EU of ERP-type IS, Somers *et al.* (2003) concluded that the measurement of EU satisfaction is perhaps the most determining factor for estimating IS success. This is also supported by Hsu *et al.* (2006). In dealing with human perceptions, success for some stakeholders may mean failure for others (Al-Ahmad *et al.*, 2009). Myers (2009) study, cited above, analyzed the development and implementation of a payroll IS by decision of the Department of education of New Zealand. Such an IS had to be discontinued due to its rejection by the EU, even though it had already been installed and declared successful by the rest of stakeholders who considered that it worked acceptably. Similar situations reinforce the thesis that the EU are who ultimately determine the acceptance or rejection of an IS. That happens more quickly when such attitude is promoted by supervisors or workmates. Even though technology acceptance models (TAM, TAM2, TAM3 and new versions), which analyze certain variable behavioral determinants of acceptance and use of IS/IT, are useful (Ramírez-Correa *et al.*, 2010), their central point that technology is the driving force of change has turned out to be invalid (Myers, 2009).

The knowledge contributed by the EUR

This latent variable in the study model represents the explicit and tacit knowledge related to strategic, functional, administrative and sociocultural aspects of the business and of the user department or area in question, required from the EUR (Nonaka, 1991; Schultze and Leidner, 2002). ERP-type IS are known for bringing a high degree of change in business processes, procedures, tasks and management practices (Morris and Venkatesh, 2010). Hence, uncertainty or inaccuracy from the EUR in providing information requirements specifications has a direct and negative impact on the response capacity of the new IS (Shih-Chieh, *et al.*, 2008). The rate of change in business environments and the evolution of organizational processes accentuate this issue (Kautz *et al.*, 2010). Bruque *et al.* (2004) questioned if IT in organizations were better accepted and used when complementary human and management capabilities were developed simultaneously; however, they failed to look into it from an empirical approach. The present investigation posits that the knowledge of strategies and business plans must come from senior management and the functional units involved; not from the IS/IT people. Years of IS praxis allow the first author to assert that even when IS analysts might have this capacity, is not within their competence to take over the EUR's role, thus avoiding erroneous initiatives. IS/IT people's role is to focus on mastering the knowledge, skills and dexterity for the application of the complex and ever changing IS/IT tools. All this leads to consider the first hypothesis:

H1- The success of an IS, during its development and mainly once implemented, is highly correlated with the knowledge provided by the EUR.

The participation of the EUR

After combining definitions from various authors (Barki and Hartwick 1989; Barki et al, 2001; Marcus and Mao, 2004) the construct 'EUR participation' refers to a timely, relevant and proactive attitude that translates participation into a significant contribution. This pursues to avoid the popular quotation "... participating with their bodies, but with their minds, almost nobody." Thus, this category comprises the activities that the EUR must accomplish as representatives of their absent peers from an ISDP (the vast majority), in order to prevent their dissatisfaction with the outputs (Terry and Standing, 2004). Only quality and timely participation, taken to heart, can lead to correspondence between IS outputs and the EU's needs to be satisfied (Saarinen and Saaksjarvi, 1990). This leads to the following hypothesis:

H2- The success of an IS, during its development and mainly once implemented, is highly correlated with a quality participation from the EUR.

The commitment of the EUR

The construct 'EUR commitment' is treated separately from 'EUR participation' by Barki and Hartwick (1989) in reference to a subjective psychological state which reflects the significance and personal support that the EUR give to an ISDP. A necessary requirement for achieving an effective commitment is the adoption of functional organizational structures, characterized by flexibility and dynamism resulting from decentralized decision-making (Rastrollo and Castillo, 2004). That would keep a good degree of formalization thus allowing helpful interactions to capitalize on knowledge, by moving it from tacit to explicit. These authors claim that "... individual behavior formalization can be achieved by the internalization of norms and values, rather than the imposition of conduct rules." (*Ibid.*, p. 141). However, it is not a matter of a simple transmission of abstract and decontextualised knowledge from one individual to another, but a social process whereby knowledge is co-constructed, in a specific context and embedded within a particular social and physical environment (Lave and Wenger, 1991). Also García and Rangel (2001), from an empirical study of six organizations that had recently implemented an ERP package at their Human Resources departments, found that for half of those companies the average measure of resistance to change, as a degrading element of the EUR commitment, was between medium and high levels. This leads to a third hypothesis:

H3- The success of an IS, during its development and mainly once implemented, is highly correlated with a quality commitment from the EUR.

The term 'EUR's accountability' for the success/failure of an IS comes implicit into the two previous constructs and is as taboo as the term 'power', within organizations. Andrade and Mandrillo (2004) refer that Philip Kotler (cited by Joseph LaPalombara, 2001) found out that only five out of 2000 papers in the Harvard Business Review, for a period of 20 years, included the word 'power' in their titles, dealing with the topic as a "dirty family secret: everyone knows it, but nobody dares to openly discuss it." (*Ibid.*, p. 612). They also point to a more recent review done by Kotler revealing that just about a dozen papers in a total of 3000 published between 1960 and mid-1999 showed the word 'power' in their titles. We argue that the 'power' in (and be-

hind) the EUR regarding IS/IT could be considered another family secret, untouched by the management theory and IS research.

Net benefits

The 'net benefits' dimension is adopted from the updated model of DeLone and McLean (2003) and represents the EU's individual and group increase in job performance, based on the way they perceive IS meet their work needs. This dimension can be seen as a mediator variable to the net benefits expected by the rest of stakeholders in an organization (DeLone and McLean, 2003; Byrd *et al.*, 2006; Mithas *et al.*, 2012). However, the latter relationship is beyond the scope of this research. More than two decades ago, Davis *et al.* (1989) reported that no benefit may be derived from IS when these are neither accepted nor used effectively. To this end, not only must the IS be perceived as helpful tools but also stay in line with a suitable social and political environment, which additionally has been recurrently confirmed in the IS praxis. Therefrom the following hypothesis is presented:

H4: The IS benefits expected by the EU are highly correlated with their own IS satisfaction, upon implementation.

Our research model (Figure 2) connects two distinct and separate result categories mentioned by Marcus and Mao (2004, p. 525): "the development success and the implementation success of IS.". A similar differentiation is made by Wagner and Newell (2007), upon citing Sawyer (2001, p. 100) when they allege: "It is only during implementation when users get deeply involved for the first time in evaluating how the software meets their needs". Regardless the significance of the first category its parameters are only associated with the efficiency achieved in the development process, not the effectiveness of the software, which is accounted for in the second category.

Field Study and Methodological Approaches

This empirical research was conducted in Latin America and comprised the four large industrial companies which, vertically integrated, constitute the aluminum sector of Venezuela. They, together with their sibling companies in the iron, steel and gold sectors (also state-owned), comprise the major non-oil development alternative.

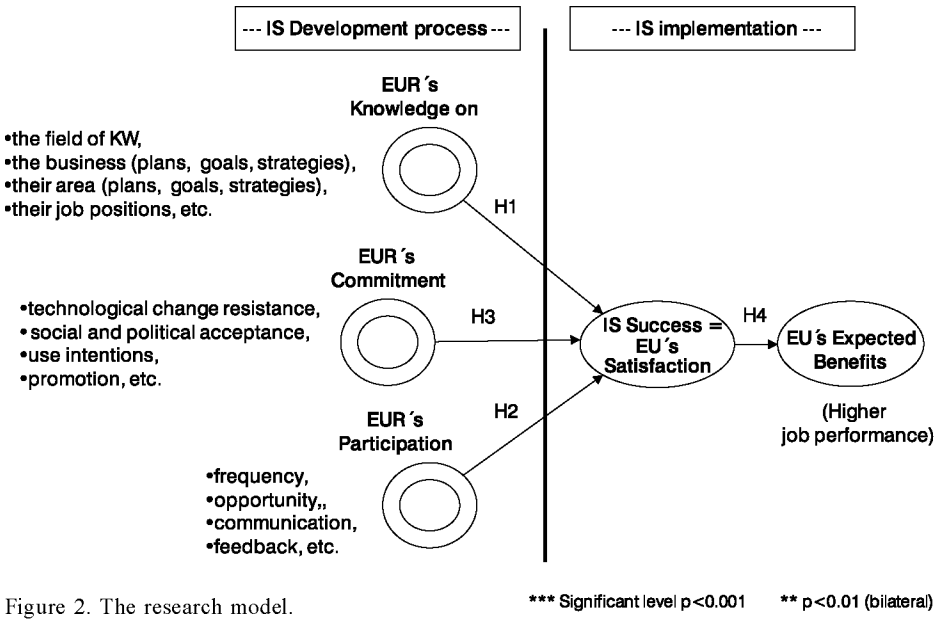

Figure 2. The research model.

These four industrial companies were uniformed under a macro ISDP for the installation of the ERP software SAP R/3. The EUR had a leading role for the adaptation of the different modules, as well as for the development of new ones not provided by the package. Relevant aspects such as the variety and complexity of the ISDP and the importance of these companies had a bearing on their selection for the object of study. The field work included surveys and interviews with highly experienced executives and professional developers in the IS area, as well as some EUR project leaders. A possible criticism at this point might be the emphasis placed on the perceptions of such professionals. However, being most of them mature IS specialists with an extensive career in ISDP, working in constant interaction with the EUR throughout the ISDP, it was deemed that their judgments offered a high level of reliability. Besides, they are who confront firsthand the issues under analysis.

A major point was that EUR show, for various reasons, a tendency to hide their mistakes, something observed in practice and to which also attest DeLone and McLean (2003) as they cite a study by Straub *et al.*, who studied 458 EU of a voicemail IS and found that the self-reported use did not match the use registered automatically by the computer. This is an example of EU not giving true information, detected when their answers were compared with an automatic counter hidden in the system. Hence, it has been estimated that inputs from senior IT professionals regarding the EUR's skills and attitude contributed to ISDP are at least as reliable as those from the EUR themselves. Therefore, a similar strategy has been used effectively by many researchers (Subramanian *et al.*, 2007; Bartis and Mitev, 2008; Shih-Chieh, 2008; Conboy, 2010; O'hEocha *et al.*, 2010; Yu-Chih *et al.*, 2010).

A double statistical-interpretive analytical approach, based on the triangulation technique, defined as the combination of different research methods, was used to merge a quantitative method with a qualitative one, in concordance with a theory proposed by Myers (2009). A questionnaire was used for the statistical part, while semi-structured interviews including, among others, the same indicator variables in the questionnaire served to complement both instruments. In order to ensure statistical variability, all perceptual measures in the questionnaire were based on a five-point Likert scale, where 1: disagree, 2: partially disagree, 3: average or unsure, 4: partial agreement and 5: complete agreement. Values close to 1 were considered to be low, those close to 5 as high and those over 3 as acceptable.

Quantitative analysis approach

The questionnaire was initially face-validated by a group of IS experts including high-level IT executives, IS-quality-assurance consultants and IS researchers whose suggestions were implemented to obtain a revised version of the instrument. Then a pilot test was carried out with experienced analysts in IS development and implementation obtaining a Cronbach's alpha

reliability (or internal consistency) >0.89. The data were subjected to factor analysis, with extraction of principal components, Varimax type rotation method with Kaiser, and a variance analysis criterion= 1. The dimensions were configured with indicator variables taken from similar empirical studies (Saarinen and Saaksjarvi, 1996; DeLone and McLean, 2003; Kappelman *et al.*, 2006; Lesca and Caron-Fasan, 2008; Ouadahi, 2008; Shih-Chieh *et al.*, 2008; Yu-Chih *et al.*, 2010) and the literature on the subject. This analysis was based on a convenient non-random sampling (Ramírez-Correa *et al.*, 2010). The questionnaire was e-mailed to respondents, active members of the ISDP during both the phases of development and implementation and who could testify to the issues under study.

A total of 107 questionnaires showing valid responses were returned, representing an effective 35% response rate, which is similar to the resulting rates of many surveys on IS (Paulk *et al.*, 1995; Kappelman *et al.*, 2006) and well above the suggested minimum level of 20% for organizational surveys of this type (Yu and Cooper 1993; Ravichandran and Rai, 2000). According to Pinsonneault and Kraemer (1993), a large percentage of surveys on IS tend to have a low rate of response, being a common reason the number of surveys that this kind of professionals receive. By using the SmartPLS software, a statistical analysis was carried out based on the partial least squares (PLS) technique, suitable to test new models (Wold, 1982) using small samples (Lohmoller, 1989) and its capacity to overcome the multicollinearity problem. Reflective indicators have been used due to their dependence on the latent variable, the high correlation between them and, contrary to formative variables, their feature of not being affected by multicollinearity (Haenlein and Kaplan, 2004). The construct "EU satisfaction" is treated as a mediator variable for its capacity to regulate the impact between the predictor and the criterion variables. On the other hand, according to Aguinis (2004, p 156), "Moderator variables play a role of growing importance for researchers and practitioners, since they indicate the conditions under which one or more independent variables exert their effects on a dependent variable. In this study, the satisfaction of the end user is a mediator variable, increasing the robustness of the model rather than seeking generality, since the main effects, are not inherently, a guarantee of sufficient precision.".

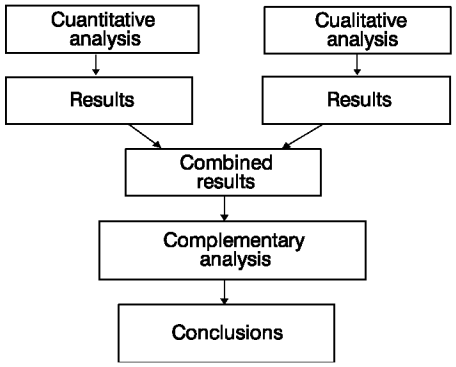

Figure 3: Combination of research methods.

Qualitative analysis approach

A hermeneutical/dialectical interpretive analysis of discourse and content was carried out by applying the double-hermeneutics technique, which requires (Myers, 2009, p. 190) that the researcher: "... must already speak the same language as the people being studied (or, at the very least, be able to understand an interpretation or translation of what has been said)." Having worked for decades in the IS discipline, this requirement did not represent any obstacle whatsoever. This analysis was also based on 'the hermeneutic circle' and 'prejudice' concepts (*Ibid.*, p. 185-186). For this qualitative approach, individual, direct interviews were applied to seven key informants including four executives who were actively working during the whole ISDP. Also three EUR appointed as permanent members of the project team who, in turn, as EU leaders interacted with other EUR guiding them throughout the adaptation or development of the SAP/R3's modules. The answer to generalizing on the basis of a single case study, as the present, is taken from Yin (1989) who affirms that it is possible to generalize by means of theoretical propositions. The four types of generalization of Walsham (1995) have also been considered, given that these are not mutually exclusive in interpretive analysis: a) concept development, b) theory creation, c) delineation of specific consequences, and d) useful insights contribution. The impacts of the studied EUR factors during each of the traditional phases of any ISDP (analysis/ design/ programming/ test/ implementation) were of major concern. Figure 3 summarizes the applied schema.

Analysis, Results and Model Validation

A descriptive analysis revealed that most of the IS professionals surveyed were in the age range of 31-45 years, with higher education, job stability in the range of 8-10 years and a mean of 10 years of work experience. Of the sample, 56% were men, allowing for a balance in the influence of the sex variable. As latent variables of ordinal type, median values are considered the most representative, being the highest the EUR knowledge (3413), followed by EUR participation (3320) and EUR commitment (3266). These descriptive results confirm the high level of maturity, career preparation and work experience sought in the sample. Individual reliability of the reflective-type items in each construct was determined by their loadings using SmartPLS. Values between 0.730 and 0.843 were found, even when loadings between 0.55-0.6 or above for a sample of size 85-100 can be considered valid (Quey-Jen and Chih-Ling, 2001; Cepeda and Roldán, 2004). Convergent validity and internal consistency reliability of the model constructs were calculated by estimating composite reliability, with a value over the 0.70 threshold and the extracted variance >0.5, parameters recommended for social sciences research (Bacon *et al.*, 1995) and shown in Table I.

TABLE I
CONFIRMATORY FACTORIAL ANALYSIS

Constructs	CR*	AVE
EUR Knowledge	0.892	0.541
EUR Participation	0.908	0.662
EUR Commitment	0.778	0.504
EUR Satisfaction	0.875	0.690
EUR Expected benefits	0.837	0.789

* Composite reliability.

All correlations between constructs remained under 0.7, with an average variance extracted (AVE) >0.5, which indicates appropriate discriminant validity. Table II shows the squared root of each AVE which are higher than the correlations with the other constructs and >0.7.

The hypotheses were evaluated by examining path coefficients (β) and the significance levels (β ≥0.2 accepted). A bootstrapping with 500 sub-samples was performed to verify the significance of each coefficient. The explained variance (R^2) in the endogenous VLs and the significance coefficient of regression (F test) serve as indicators of the model´s explanatory capacity. The path coefficients demonstrate significant correlations between the predictor variables and the criterion variable, as well as between the latter and the variable

TABLE II
DISCRIMINANT VALIDITY

Constructs	EUR Knowledge	EUR Commitment	EUR Participation	EU Satisfaction	EU Expected benefits
EUR Knowledge	0.736				
EUR Participation	0.512	**0.710**			
EUR Commitment	0.572	0.603	**0.814**		
EUR Satisfaction	0.613	0.505	0.549	**0.831**	
EUR Expected benefits	0.579	0.649	0.672	0.733	**0.888**

TABLE III
TEST OF HYPOTHESES

Hypothesis	Path coefficient	t-statistics	Accepted
EUR Knowledge » Satisfaction	0.573	18,214	Yes
EUR Commitment » Satisfaction	0.469	11,374	Yes
EUR Participation » Satisfaction	0.505	9,053	Yes
EU Satisfaction » Expected benefits	0.733	14,257	Yes

EU expected benefits (Table III). Based on these results, the four hypotheses H1, H2, H3 and H4 are accepted. The results are illustrated in Figure 4.

Next, a hermeneutics/dialectic analysis helped put into context the statistical results. The dimension 'EUR knowledge' featured again its importance and consequences, especially during the definition of the specifications. Serious problems emerged in cases where the quality of this dimension was low, due to the wrong selection of the respective EUR. Failures in the 'EUR participation' dimension were mostly in its frequency and opportunity for reasons of heavy workloads, lack of communication, missing feedback and rejection of some changes. In cases where the 'EUR commitment' failed, it was also notorious for the resistance to changes in contractual benefits, procedures and functionality brought by the SAP/R3, seriously affecting the plans and schedules. The high correlation between the variable 'EU satisfaction', as a mediator variable, and the variable 'EU expected benefits' could be analyzed to support our argument that the role of the EUR heavily impacts the quality of the ISDP's outputs, affecting the benefits expected by the EU. Likewise, the benefits expected by the rest of the stakeholders did not realize when the fulfillment of the EU benefits failed (DeLone and McLean, 2003). A good example of this occurred with the payroll and HR management IS, both difficult to automate mainly due to underlying complexities in the labor agreement clauses, due to their interpretations and the numerous algorithms involved in large organizations. A strong restrictive reaction occurred at one of the largest subsidiaries when its labor union objected to changes brought by the ERP software, leading to serious setbacks. It caused the refusal and postponement of the development and implementation of the HR department's IS for a few years. In other cases, the project members were disappointed by some EUR self-considered experts in their area who provided incorrect specifications, giving rise to reprocessing, excessive consumption of resources and rejection of the IS once finished. A noticeable example emerged from the Standard Costs module when, again, wrong specifications dictated by an unqualified EUR brought about EU resistance to use the IS once implemented. This problem had been long in place at the time of this investigation.

Additionally, testimony was obtained to some too common, damaging situations in IS projects, arising from the aforementioned drawbacks, which consist in delegating on systems analysts the task of dictating functional (not technological) IS specifications. By the same token, another very frequent and costly situation when it comes to ERP packages and also found here, was the poor support provided by the software vendor. This issue demanded urgent training of the internal IS analysts and programmers staff, in order to take control of the SAP/R3, causing significant drawbacks leading to costly increases in time and money. These situations are repeated at different organizations which reveal that many ERP vendors' staff are sent to client firms as experts, but happen to be novices who do not master the software and are more devoted to learning rather than teaching or leading. In summary, at the organizational units where irregular situations took place developments suffered significant difficulties impacting the plans and the EU satisfaction with their IS, once implemented. The opposite occurred with most modules of the SAP/R3 where 'quality' EUR factors were present.

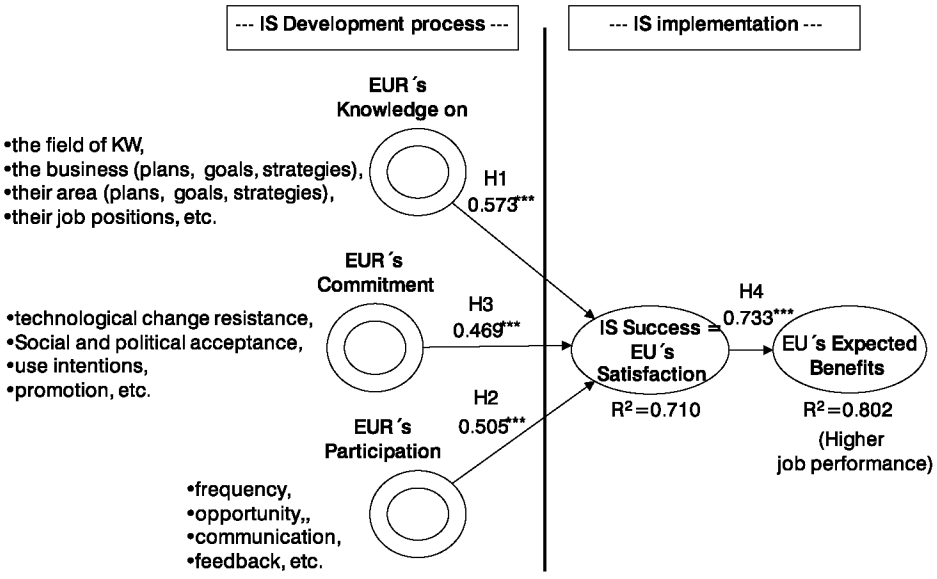

Figure 4. Model validation.

Discussion

Findings from the quantitative and qualitative approaches, which match and complement one another, prove the high level of impact and consequences of the studied factors, showing directionality with the extant theory. It must be highlighted that throughout this macro ISDP the EUR played a participatory and leading role,

especially in terms of functionality definition, in contrast to cases where technical characteristics and functionality of the IS are imposed to the EU. As to the majority of SAP/R3 modules, where the EUR fulfilled the expectancies, the ISDP ran smoothly and outcomes were highly satisfactory. It was also possible to realize the influence and power exerted by the EU and related restrictive forces existing in organizations, as seen especially in some departments, as well as that of the labor unions, an unexpected an highly influential stakeholder. Therefore, EUR´s capacities and attitude must be tested not only at the initial intentions of acceptance and use, as proposed by TAM models (Ramírez-Correa *et al.*, 2010), before being appointed to an ISDP team, but also afterwards (Myers, 2009). Pre-planning is required to adapt human capital and management to technological developments.

Another unexpected finding, contrary to those of many researchers, was the little relevance of the category 'EUR knowledge' on IT during an ISDP, as it was also the great social and political power that the EU can exert in public organizations affecting such projects. The saliency of the 'EUR knowledge' factor and the high impact of the behavioral dimensions of the EUR suggest a need for deepening this research with the support of behavioral sciences and disciplines like knowledge management and emotional intelligence. Once more, it was also determined that some vendors´ incapacity to fulfill their obligations is a major concern, frequently leading to additional significant costs and delays. The latter is another critical issue to management and practitioners, which is neither found in literature nor research. Hence, when acquiring complex software packages, a wise decision is to include protection clauses in contracts with the IS provider/consultant to cover from possible default; especially, regarding the effectiveness of their workforce, estimated costs and schedules.

As mentioned in the theoretical antecedents, new helpful motivational strategies such as gamification techniques, properly applied, could prove very useful to overcome some of the main issues presented in this article. Morrison *et al.* (2012) provide insights on intrinsic motivation *versus* extrinsic motivation and identify a) four kinds of motivation, b) four different player types, and c) personality types and motivation. They also explain how success in motivating gamers translates to business scenarios, common game mechanics and how they can affect motivation. It is highly recommended that business managers and IS/IT practitioners get familiar with game-design techniques that can be used business wide and specifically in ISDP environments for creating/increasing EUR engagement. Mathaisel and Gruman (2012) explain, among other things, 'the case for game mechanics in IT projects' and confirm that "The failure rate continues to be fairly high for IT deployments—often due to low use or indifference, not poor quality technology." They assert it could be overcome, for instance, "by helping IT initiatives get pulled by the users, not pushed on them". Gamification could be applied on designing the style and format of the EU interface and, after implementation, via some incentives and rewards built into the application, using help from those who have a solid understanding of human factors. Besides, it is a must that such knowledge be transferred from those experts to those inside IT who are responsible for IS development. An ISDP and the implementation process can be seen as interconnected sets of puzzle-building tasks leading to the design of game-like strategies, following gamification guidelines, with performance-based incentives to EUR and user departments. Nonetheless, Chuck Coonradt words must be kept in mind: "Gamification must always be a complement, not a substitute for all relationships between employees and their leaders [...] Gamification has arrived to stay, because it motivates workers, but it must be applied properly [...] It is like introducing entertaining dynamics into boring environments." (Lantigua, 2013).

This study´s contributions to theory and practice are primarily addressed to management and IS/TI professionals, so they can take preemptive actions in order to favor ISDP´s success. In general, the primary *cui bono* of this study is aimed to create awareness in management and IS practitioners involved in PDSI regarding EUR related risky issues, from a management, non-technical approach. A contribution from an academic perspective pursues to provide useful knowledge that can be inserted in the contents of the subjects on IS in undergraduate and, in particular, graduate management programs in order to educate future managers to perform effectively in their ISDP when holding managerial positions. Finally, the latent variables of the proposed model can be used to retrospectively expand the updated model of DeLone and McLean (2003), placing them as predictors of their constructs 'information quality' and 'quality of the IS (as a tool)'.

Conclusions

The significant correlations found between the EUR factors and the perceived EU (dis)satisfaction allow to answer the first research question and to reach our first objective. Likewise, the answer to the second question and the second objective were found basically through the results of the hermeneutic/dialectical analysis. Our work shows to what degree and how the analyzed EUR constructs can influence ISDP´s success along the development and implementation periods, posing a serious management challenge in properly internalizing and managing the role of the EUR which, when not met, can lead to dysfunctional IS that create dissatisfaction in the EUR themselves and the rest of the EU community. Considering the saliency of the 'EUR knowledge' factor, knowledge management must play a key role in organizations.

Findings in recent research confirm that total and partial failures continue with a tendency to get worse (Wu and Fang, 2007) and are the socio-behavioral and political factors, not the technological, the most worrying ones, coinciding with Laudon and Laudon (2012). For this reason, we insist that although the role of the EU has been analyzed in a number of studies, the problem presented herein is still globally prevalent, thus demanding new approaches, such as the present one, with preference to qualitative methods. Therefore, based on the combination of the quantitative and qualitative results and what has been observed in the praxis, at various organizations, it can be concluded that in the studied dimensions of the EUR alone can lie much of the explanation to the posed problem, with a direct repercussion on the recurring failures and losses in IS investments. Nonetheless, the proper selection of the EUR and their inherent responsibility continue as a taboo, and without receiving the required attention from the theory, research and management. Given that most medium and large organizations, at a global level, are no strangers to these phenomena, even with disregard of the IS types, it is contended that this study´s proposed model, findings, conclusions and suggestions posses a significant degree of generalization. A main value-added practical contribution of this research is to serve as a wake-up call on the criticality of the subject matter.

A limitation of this study may be that it is based on the ISDP of an ERP package in four large,

complex organizations which required to perform internal developments for several modules due to missing functionality from the SAP R/3, a very common issue in organizations with these characteristics. Having carried out the research in a developing country of Latin America could be seen as another limitation. Also, the transverse or synchronous nature of the study suggests a diachronic or longitudinal approach as another option for future research, to compare with results from subsequent post-implementation stages from the onwards and upwards phase of an ERP's lifecycle (Markus *et al.*, 2003).

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DOS TABÚES RIESGOSOS Y COSTOSOS RELACIONADOS CON EL USUARIO FINAL AL DESARROLLAR SISTEMAS DE INFORMACIÓN: CALIFICACIONES Y RESPONSABILIDAD

José Luis Calderón Amaya, Carlos Rodríguez Monroy y Julián Chaparro Peláez

RESUMEN

Este trabajo destaca dos tabúes críticos en las organizaciones: 1) tomar por seguras la calidad de ciertas capacidades y actitudes de los representantes de usuarios finales (RUF) en proyectos de desarrollo de sistemas de información (PDSI), y 2) la responsabilidad inherente al RUF por pérdidas en inversiones en SI. Estos problemas no son atendidos por la teoría ni por las investigaciones al medir éxitos/fracasos. Se aplicó un enfoque de triangulación para combinar métodos cuantitativos y cualitativos, obteniendo resultados convergentes y mostrando que en casos problemáticos, paradójicamente, el origen del rechazo a los SI por los usuarios finales (UF) apunta a los RUF mismos. Se evaluó hasta qué punto algunos factores de RUF impactaron un PDSI macro que involucró un paquete de planificación de recursos empresariales (PRE), calificando el conocimiento de los RUF como la variable latente más importante. Los resultados validan algunas situaciones encontradas en décadas de praxis, confirmando que cuando no es manejado apropiadamente, el papel del RUF tiene una relación directa con el rechazo a los SI y pérdidas significativas en inversiones en SI.

DOIS TABUS CUSTOSOS E ARRISCADOS RELACIONADOS AO USUÁRIO FINAL AO DESENVOLVER SISTEMAS DE INFORMAÇÃO: REQUERIMENTOS E RESPONSABILIDADES

José Luis Calderón Amaya, Carlos Rodríguez Monroy e Julián Chaparro Peláez

RESUMO

Este trabalho destaca dois tabus críticos nas organizações: 1) assumir como certa a qualidade de algumas capacidades e atitudes dos representantes de usuários finais (RUF) em projetos de desenvolvimento de sistemas de informação (PDSI), e 2) a responsabilidade inerente ao RUF por perdas em investimentos em SI. Estes assuntos não são atendidos pela teoria nem pelas investigações ao medir êxitos/fracassos. Aplicou-se um enfoque de triangulação para combinar métodos quantitativos e qualitativos, obtendo-se resultados convergentes e mostrando que em casos problemáticos, paradoxalmente, a origem de rejeição aos SI pelos usuários finais (UF) aponta aos RUF mesmos. Avaliou-se até que ponto alguns fatores de RUF impactaram um PDSI macro que involucro um pacote de planificação de recursos empresariais (PRE), qualificando o conhecimento dos RUFs como a variável latente mais importante. Os resultados validam algumas questões encontradas em décadas de práxis, confirmando que quando não é manejado apropriadamente, o papel do RUF tem uma relação direta com a rejeição aos SI e perdas significativas em investimentos em SI.